In the Claims

1. (currently amended) A method of producing nitrogenous semiconductor crystal materials <u>of the form $A_XB_YC_ZN_VM_W$</u> in the nature of strata on a wafer [of the form $A_XB_YC_ZN_VM_W$], wherein A, B and C represent elements of elemental group II or group III, N represents nitrogen, M represents an element of elemental group V or group VI, and X, Y, Z, V and W represent the mol fraction of each element in $A_XB_YC_ZN_VM_W$, in a reactor comprising a reaction chamber defined by a set of chamber walls and an upper side and lower side thereof, a first wafer support positioned within the reaction chamber, a gas inlet through which process gases flow into the reaction chamber, a gas mixing system in fluid communication with the reaction chamber, a gas outlet through which the process gases are discharged from the reaction chamber, a second wafer support positioned on the first wafer support, a heating system for heating the first wafer support, and a controller for controlling the process gases and [a set of process temperatures and variations thereof characteristic of] the reaction chamber; the method comprising:

controlling [the set of] <u>at least one</u> process temperature[s] <u>and the temporal variation thereof in correspondence with a numerically simulated temperature variation profile,</u> wherein the [set of] <u>at least one</u> process temperature[s is selected from the group consisting of] <u>comprises</u> the temperature of the gas inlet, T_1, the temperature of the chamber walls, T_2, the temperature of the first wafer support, T_3, the temperature of the second wafer support, T_4, the temperature of the gas outlet, T_5, the temperature of the gas mixing system, T_6, the temperature of the upper side of the reaction chamber, T_7, and the temperature of the heating system, T_8; <u>and</u>

[controlling the temporal variation of the set of process temperatures; and]

controlling process parameters in the reaction chamber.

2. (currently amended) The method according to Claim 1 wherein controlling the [set of] at least one process temperature[s] comprises controlling the temperature of the gas inlet, T_1, so as to be below a condensation temperature of the process gases.

3. (currently amended) The method according to Claim 1 wherein controlling the [set of] at least one process temperature[s] comprises controlling the temperature of the chamber walls, T_2, so as to be equal to the temperature of the first wafer support, T_3.

4. (currently amended) The method according to Claim 1 wherein controlling the [set of] at least one process temperature[s] comprises controlling the temperature of the first wafer support, T_3, as a constant temperature.

5. (currently amended) The method according to Claim 1 wherein controlling the [set of] at least one process temperature[s] comprises controlling the temperature of the second wafer support, T_4, in correspondence with the temperature of the first wafer support, T_3.

6. (currently amended) The method according to Claim 1 wherein controlling the [set of] at least one process temperature[s] comprises controlling the temperature of the gas outlet, T_5, to a value smaller than the value of the temperature of the second wafer support, T_4, and the temperature the first wafer support, T_3.

7. (currently amended) The method according to Claim 1 wherein controlling the [set] at least one of process temperature[s] comprises controlling the temperature of the gas mixing system, T_6, as a constant temperature smaller than the temperature of the gas inlet, T_1.

8. (currently amended) The method according to Claim 1 wherein controlling the [set of] at least one process temperature[s] comprises controlling the temperature of the upper side of the reaction chamber, T_7, as a constant temperature in correspondence with the temperature of the first wafer support, T_3.

9. (currently amended) The method according to Claim 1 wherein controlling the [set of] at least one process temperature[s] comprises controlling the temperature of the heating system, T_8, as a constant temperature in correspondence with the temperature of the first wafer support, T_3.

10. (currently amended) The method according to Claim 1 wherein controlling the [set of] at least one process temperature[s] comprises controlling a temperature-dependent gas flow variation.

11. (currently amended) The method according to Claim 1 wherein controlling the [set of] at least one process temperature[s] comprises controlling a temperature-dependent total pressure variation in the reaction chamber.

12. (currently amended) The method according to Claim 1 wherein controlling the [set of] at least one process temperature[s] comprises controlling a temperature-dependent principal carrier gas variation in the reaction chamber.

13. (currently amended) The method according to Claim 1 wherein controlling the [set of] at least one process temperature[s] comprises controlling temperature-dependent interrupts in the production process.

14. (previously presented) The method according to Claim 1 further comprising applying the semiconductor materials to be produced on a mechanical carrier of a semiconductor of group IV, a semiconductor of groups III-V, oxides or any other material resistant to temperatures and the process gases.

15. (previously presented) The method according to Claim 14 further comprising pre-treating said mechanical carrier by applying lines, dots, or by carrying out other steps for surface treatment, or by partially covering the surface with other materials or material components.

16. (previously presented) The method according to Claim 1 further comprising a two-stage application of pre-processed $A_XB_YC_ZN_VM_W$ materials.

17. (currently amended) The method according to Claim 1 wherein controlling the **[**set of**]** <u>at least one</u> process temperature**[**s**]** comprises employing a temperature-controlled injector.

18. (withdrawn).

19. (currently amended) The method of Claim 4 wherein controlling the **[**set of**]** <u>at least one</u> process temperature**[**s**]** comprises controlling the temperature of the first wafer support, T_3, up to about 1600 degrees centigrade.

20. (currently amended) The method of Claim 19 wherein controlling the temporal variations of the **[**set of**]** <u>at least one</u> process temperature**[**s**]** comprises controlling the temperature of the first wafer support, T_3, with temperature variations of up to 250 degrees per minute.

21. (currently amended) The method of Claim 4 wherein controlling the [set of] at least one process temperature[s] comprises controlling the temperature of the first wafer support to an accuracy of 0.1 degrees centigrade.

22. (new) The method of Claim 6 wherein the temperature of the second wafer support, T_4 is less than the temperature of the first wafer support, T_3.

23. (new) A method of adjusting material characteristics of semiconductor compounds of the form $A_XB_YC_ZN_VM_W$ in the nature of strata on a wafer, wherein A, B and C represent elements of elemental group II or group III, N represents nitrogen, M represents an element of elemental group V or group VI, and X, Y, Z, V and W represent the mol fraction of each element in $A_XB_YC_ZN_VM_W$, in a reactor comprising a reaction chamber defined by a set of chamber walls and an upper side and lower side thereof, a first wafer support positioned within the reaction chamber, a gas inlet through which process gases flow into the reaction chamber, a gas mixing system in fluid communication with the reaction chamber, a gas outlet through which the process gases are discharged from the reaction chamber, a second wafer support positioned on the first wafer support, a heating system for heating the first wafer support, and a controller for controlling the process gases and parts of the reaction chamber; the method comprising:

controlling at least one process temperature and the temporal variation thereof in correspondence with a numerically simulated temperature variation profile, wherein the at least one process temperature comprises the temperature of the gas inlet, T_1, the temperature of the chamber walls, T_2, the temperature of the first wafer support, T_3, the temperature of the second wafer support, T_4, the temperature of the gas outlet,

T_5, the temperature of the gas mixing system, T_6, the temperature of the upper side of the reaction chamber, T_7, and the temperature of the heating system, T_8.

24. (new) The method of Claim 23 wherein the material characteristics comprise an electron concentration of up to 10^{20} cm^{-3}.

25. (new) The method of Claim 23 wherein the material characteristics comprise a hole concentration of up to 10^{18} cm^{-3}.

26. (new) A quantum well produced by the method of Claim 23.

27. (new) The quantum well of Claim 26 wherein the quantum well is InGaN/GaN.

28. (new) A semiconductor material having a $A_{1X}B_{1Y}C_{1Z}N_{1V}M_{1W}$/ $A_{2X}B_{2Y}C_{2Z}N_{2V}M_{2W}$ heterostructure produced from the method of Claim 23.

29. (new) A method of producing nitrogenous semiconductor crystal materials of the form $A_XB_YC_ZN_VM_W$ in the nature of strata on a wafer, wherein A, B and C represent elements of elemental group II or group III, N represents nitrogen, M represents an element of elemental group V or group VI, and X, Y, Z, V and W represent the mol fraction of each element in $A_XB_YC_ZN_VM_W$, in a reactor comprising a reaction chamber defined by a set of chamber walls and an upper side and lower side thereof, a first wafer support positioned within the reaction chamber, a gas inlet through which process gases flow into the reaction chamber, a gas mixing system in fluid communication with the reaction chamber, a gas outlet through which the process gases are discharged from the reaction chamber, a second wafer support positioned on the first wafer support, a heat-

ing system for heating the first wafer support, and a controller for controlling the process gases and the reaction chamber; the method comprising:

controlling each of the temperature of the gas inlet, T_1, the temperature of the chamber walls, T_2, the temperature of the first wafer support, T_3, the temperature of the second wafer support, T_4, the temperature of the gas outlet, T_5, the temperature of the gas mixing system, T_6, the temperature of the upper side of the reaction chamber, T_7, and the temperature of the heating system, T_8 and the temporal variation thereof in correspondence with numerically simulated temperature variation profiles.

30. (new) A method of adjusting material characteristics of semiconductor compounds of the form $A_XB_YC_ZN_VM_W$ in the nature of strata on a wafer, wherein A, B and C represent elements of elemental group II or group III, N represents nitrogen, M represents an element of elemental group V or group VI, and X, Y, Z, V and W represent the mol fraction of each element in $A_XB_YC_ZN_VM_W$, in a reactor comprising a reaction chamber defined by a set of chamber walls and an upper side and lower side thereof, a first wafer support positioned within the reaction chamber, a gas inlet through which process gases flow into the reaction chamber, a gas mixing system in fluid communication with the reaction chamber, a gas outlet through which the process gases are discharged from the reaction chamber, a second wafer support positioned on the first wafer support, a heating system for heating the first wafer support, and a controller for controlling the process gases and parts of the reaction chamber; the method comprising:

controlling at least one process temperature and the temporal variation thereof in correspondence with a temperature variation profile, wherein the at least one process temperature comprises the temperature of the gas inlet, T_1, or the temperature of the chamber walls, T_2, or the temperature of the first wafer support, T_3, or the temperature of the second wafer support, T_4.

31. (new) The method of Claim 30 further comprising controlling each process temperature and at least one temporal variation thereof.

32. (new) The method of Claim 30 wherein the temperature variation profiles are numerically simulated.

33. (new) The method of Claim 30 further comprising controlling the temperature of the gas mixing system, T_6, and the temperature of the heating system, T_8.

34. (new) The method of Claim 30 further comprising controlling the temperature of the gas outlet, T_5.

35. (new) The method according to Claim 30 wherein controlling the at least one process temperature comprises controlling the temperature of the gas inlet, T_1, so as to be below a condensation temperature of the process gases.

36. (new) The method according to Claim 30 wherein controlling the at least one process temperature comprises controlling the temperature of the chamber walls, T_2, so as to be equal to the temperature of the first wafer support, T_3.

37. (new) The method according to Claim 30 wherein controlling the at least one process temperature comprises controlling the temperature of the first wafer support, T_3, as a constant temperature.

38. (new) The method according to Claim 30 wherein controlling the at least one process temperature comprises controlling the temperature of the second wafer support, T_4, in correspondence with the temperature of the first wafer support, T_3.

39. (new) The method according to Claim 34 wherein controlling the at least one process temperature comprises controlling the temperature of the gas outlet, T_5, to a value smaller than the value of the temperature of the second wafer support, T_4, and the temperature the first wafer support, T_3.

40. (new) The method according to Claim 30 wherein controlling the at least one of process temperature comprises controlling the temperature of the gas mixing system, T_6, as a constant temperature smaller than the temperature of the gas inlet, T_1.

41. (new) The method according to Claim 30 wherein controlling the at least one process temperature comprises controlling the temperature of the upper side of the reaction chamber, T_7, as a constant temperature in correspondence with the temperature of the first wafer support, T_3.

42. (new) The method according to Claim 30 wherein controlling the at least one process temperature comprises controlling the temperature of the heating system, T_8, as a constant temperature in correspondence with the temperature of the first wafer support, T_3.

43. (new) The method according to Claim 30 wherein controlling the at least one process temperature comprises controlling a temperature-dependent gas flow variation.

44. (new) The method according to Claim 30 wherein controlling the at least one process temperature comprises controlling a temperature-dependent total pressure variation in the reaction chamber.

45. (new) The method according to Claim 30 wherein controlling the at least one process temperature comprises controlling a temperature-dependent principal carrier gas variation in the reaction chamber.

46. (new) The method according to Claim 30 wherein controlling the at least one process temperature comprises controlling temperature-dependent interrupts in the production process.

47. (new) The method according to Claim 30 further comprising applying the semiconductor materials to be produced on a mechanical carrier of a semiconductor of group IV, a semiconductor of groups III-V, oxides or any other material resistant to temperatures and the process gases.

48. (new) The method according to Claim 47 further comprising pre-treating said mechanical carrier by applying lines, dots, or by carrying out other steps for surface treatment, or by partially covering the surface with other materials or material components.

49. (new) The method according to Claim 30 further comprising a two-stage application of pre-processed $A_XB_YC_ZN_VM_W$ materials.

50. (new) The method according to Claim 30 wherein controlling the at least one process temperature comprises employing a temperature-controlled injector.

51. (new) The method of Claim 37 wherein controlling the at least one process temperature comprises controlling the temperature of the first wafer support, T_3, up to about 1600 degrees centigrade.

52. (new) The method of Claim 51 wherein controlling the temporal variations of the at least one process temperature comprises controlling the temperature of the first wafer support, T_3, with temperature variations of up to 250 degrees per minute.

53. (new) The method of Claim 37 wherein controlling the at least one process temperature comprises controlling the temperature of the first wafer support to an accuracy of 0.1 degrees centigrade.

54. (new) The method of Claim 39 wherein the temperature of the second wafer support, T_4 is less than the temperature of the first wafer support, T_3.

55. (new) The method of Claim 30 wherein the material characteristics comprise an electron concentration of up to 10^{20} cm^{-3}.

56. (new) The method of Claim 30 wherein the material characteristics comprise a hole concentration of up to 10^{18} cm^{-3}.

57. (new) A quantum well produced by the method of Claim 30.

58. (new) The quantum well of Claim 57 wherein the quantum well is InGaN/GaN.

59. (new) A semiconductor material having a $A_{1X}B_{1Y}C_{1Z}N_{1V}M_{1W}$/ $A_{2X}B_{2Y}C_{2Z}N_{2V}M_{2W}$ heterostructure produced from the method of Claim 30.